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NATIONAL DAM SAFETY PROGRAM, PARKER LAKE NUMBER 1 DAM (MO 30037--ETC(U)
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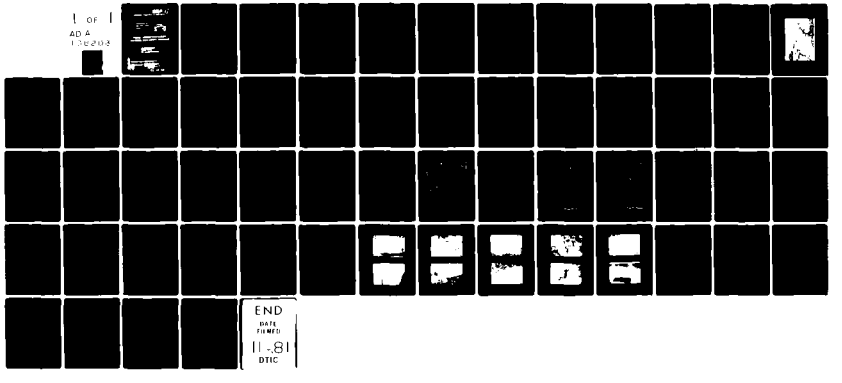


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Harold B. /Lockett
Albert B. /Becker, Jr

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18. SUPPLEMENTARY NOTES

National Dam Safety Program. Parker Lake Number 1 Dam (MO 30037), Mississippi - Kaskaskia - St. Louis Basin, Perry County, Missouri. Phase I Inspection Report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety, Lake, Dam Inspection, Private Dams

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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MISSISSIPPI - KASKASKIA - ST. LOUIS BASIN

PARKER LAKE NO. 1 DAM

PERRY COUNTY , MISSOURI

MO 30037

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

United States Army
Corps of Engineers
...Serving the Army
...Serving the Nation

St. Louis District

PREPARED BY: U.S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

MARCH 1980

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

SUBJECT: Parker Lake No. 1 Dam (Mo. 30037) Phase I Inspection Report

This report presents the results of field inspection and evaluation of the Parker Lake No. 1 Dam:

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

1. Spillway will not pass 50 percent of the Probable Maximum Flood.

2. Overtopping of the dam and/or erosion of the spillway could result in failure of the dam.

3. Dam failur significantly increases the hazard to loss of life downstream.

SIGNED

SUBMITTED BY: _____ 8 APR 1980
Chief, Engineering Division — Date

SIGNED

APPROVED BY: _____ 8 APR 1980
Colonel, CE, District Engineer — Date

PARKER LAKE NO. 1 DAM - MISSOURI INVENTORY NO. 30037

PERRY COUNTY, MISSOURI

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY:

HORNER & SHIFRIN, INC.
5200 OAKLAND AVENUE
ST. LOUIS, MISSOURI 63110

FOR:

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS

MARCH 1980

HS-7925

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Parker Lake No. 1 Dam
State Located:	Missouri
County Located:	Perry
Stream:	Jordan Branch South Fork Saline Creek
Date of Inspection:	11 October 1979

The Parker Lake No. 1 Dam was visually inspected by engineering personnel of Horner & Shifrin, Inc., Consulting Engineers, St. Louis, Missouri. The purpose of this inspection was to assess the general condition of the dam with respect to safety and, based upon this inspection and available data, determine if the dam poses a hazard to human life or property.

Parker Lake No. 1 is one of two lakes that lie within the subdivision known as Parker Lake. The dam for the second lake, Parker Lake No. 2, is located about 4,000 feet downstream of the Parker Lake No. 1 Dam. Parker Lake No. 1 has a surface area of approximately 17 acres at normal pool level whereas Parker Lake No. 2 has an area of about 50 acres at normal pool level. Spillway discharges from the upper lake flow through an unimproved channel for approximately 1,500 feet before entering the upstream end of the lower lake. A plan of the subdivision development about Parker Lake No. 1 including the dam and road system about the lake is shown on Plate 2.

The following summarizes the findings of the visual inspection and the results of certain hydrologic/hydraulic investigations performed

under the direction of the inspection team. Based on the visual inspection, the present general physical condition of the dam is considered to be unsatisfactory. The following deficiencies were noticed during the inspection and are considered to have an adverse effect on the overall safety and future operation of the dam.

1. A heavy growth of brush and trees that range in size up to about 15 inches in diameter exist on the slopes and crest of the dam. Tree roots can provide a passageway for lake seepage which could lead to a piping condition (progressive internal erosion) resulting in failure of the dam. Brush may conceal animal burrows which could also provide passageways for lake seepage.

2. Seepage was observed in several locations immediately below the dam and at the base of the rock ledge that exists within the spillway outlet channel. In some locations seepage flow was minor, less than 1 gpm, while in other locations the flow was appreciable, 10-to-15 gpm. Due to the extensive growth of vegetation, trees, brush, etc., throughout the area below the dam there may be additional areas of seepage that were undetected at the time of the inspection. Uncontrolled seepage can result in a piping condition that could result in failure of the dam.

3. Erosion, presumably by wave action, has created a near vertical bank approximately 2 feet high at the upstream face of the dam. Loss of section by erosion can impair the structural stability of the dam.

4. The spillway is in an unkept condition as evidenced by steep, uneven and eroded banks with exposed roots of trees. Continued erosion of the spillway bank adjacent to the dam can result in flow directed towards the embankment which could result in failure of the dam.

According to the criteria set forth in the recommended guidelines, the magnitude of the spillway design flood for the Parker Lake No. 1 Dam, which is classified as small in size and of high hazard potential, is specified to be a minimum of one-half the Probable Maximum Flood (PMF). Considering the fact that overtopping of the Parker Lake No. 1 Dam could result in failure of the dam, which could also lead to failure of the nearby downstream dam, Parker Lake No. 2; and that there are eight dwellings within the estimated flood damage zone, should failure of the Parker Lake No. 1 Dam occur; and that four more dwellings lie within the estimated flood damage zone should failure of Parker Lake No. 2 Dam occur; it is recommended that the spillway for the Parker Lake No. 1 Dam be designed for the PMF. The PMF is ordinarily accepted as the inflow design flood for dams where failure of the structure would increase the danger to human life. The Probable Maximum Flood (PMF) is the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

Results of a hydrologic/hydraulic analysis indicated that the existing spillway is inadequate to pass lake outflow resulting from a storm of PMF magnitude. The spillway is adequate to pass lake outflow resulting from the 1 percent chance (100 year frequency) flood and lake outflow corresponding to about 12 percent of the PMF lake inflow. According to the St. Louis District, Corps of Engineers, the length of the downstream damage zone should failure of the dam occur, is estimated to be five miles. Within the possible damage zone are Parker Lake No. 2, eight dwellings, six of which are located about Parker Lake No. 2, and several farm buildings and roads. It is noted that the Parker Lake No. 2 Dam is an earth fill embankment approximately 56 feet high and that the reservoir impounded by this dam contains approximately 322 acre feet of water.

A review of available data did not disclose that seepage or stability analyses of this dam were performed. This is considered a deficiency and should be rectified.

It is recommended that the Owner take the necessary action in the near future to correct or control the deficiencies and safety defects reported herein.

Harold B. Lockett

P.E. Missouri E-4189

Albert B. Becker, Jr.

P.E. Missouri E-9168

PHASE 1 INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

PARKER LAKE NO. 1 - ID. NO. 30037

TABLE OF CONTENTS

LIST OF PLATES

APPENDIX A - INSPECTION PHOTOGRAPHS

APPENDIX B - HYDROLOGIC AND HYDRAULIC ANALYSES

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

PARKER LAKE NO. 1 DAM - ID NO. 30037

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority. The National Dam Inspection Act, Public Law 92-367, dated 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, directed that a safety inspection of the Parker Lake No. 1 Dam be made.

b. Purpose of Inspection. The purpose of this visual inspection was to make an assessment of the general condition of the dam with respect to safety and, based upon available data and this inspection, determine if the dam poses a hazard to human life or property.

c. Evaluation Criteria. This evaluation was performed in accordance with the "Phase I" investigation procedures as prescribed in "Recommended Guidelines for Safety Inspection of Dams," Appendix D to "Report to Chief of Engineers on the National Program of Inspection of Non-Federal Dams," dated May 1975.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances. The Parker Lake No. 1 Dam is an earthfill type embankment rising approximately 36 feet above the original stream bed. The embankment has an upstream slope (above the waterline) of 1v on 1.25h, a crest width of about 12 feet, and a

downstream slope of 1v on 1.5h. The length of the dam including the spillway section is approximately 420 feet. A plan and profile of the dam is shown on Plate 4 and a cross-section of the dam is shown on Plate 5. At normal pool elevation the reservoir impounded by the dam occupies approximately 17 acres.

The spillway, a broad-crested, trapezoidal section having a bottom width of approximately 6 feet, is cut into the hillside at the right abutment. The spillway crest is founded on earth. However, at a point approximately 120 feet below the crest, the spillway channel drops abruptly at a rock ledge to the valley floor below the dam. Below the rock ledge the spillway outlet channel is unimproved. The lake does not have an emergency spillway. A road providing access to the east side of the downstream lake, Parker Lake No. 2, crosses the channel at a point approximately 500 feet below the dam. A profile of the spillway through the improved section is shown on Plate 5.

b. Location. The dam and lake are located on the Jordon Branch of the South Fork of Saline Creek, approximately 1 mile north of County Road T (Route 5) and 5 miles west of the Town of Silver Lake, Missouri, as shown on the Regional Vicinity Map, Plate 1. The dam is located in Section 31, Township 35 North, Range 9 East, in Perry County.

c. Size Classification. The size classification based on the height of the dam and storage capacity, is categorized as small. (Per Table 1, Recommended Guidelines for Safety Inspection of dams.)

d. Hazard Classification. The Parker Lake No. 1 Dam, according to the St. Louis District, Corps of Engineers, has a high hazard potential, meaning that if the dam should fail, there may be loss of life; serious damage to homes, important public utilities, main highways, railroads, or extensive damage to agricultural, industrial or commercial facilities. The estimated flood damage zone, should failure of the dam occur, as determined by the St. Louis District, extends five miles downstream of

the dam. Within the possible damage zone are Parker Lake No. 2, eight dwellings, six of which are located about Parker Lake No. 2, and several farm buildings and roads.

e. Ownership. The lake and dam are part of the estate of Freedom M. Parker, deceased, which currently is in probate court. One of the executors of the estate is Mrs. Imogene Parker. Mrs. Parker's address is Route 5, Box 136C, Perryville, Missouri 63775.

f. Purpose of Dam. The dam impounds water for recreational use.

g. Design and Construction History. According to Mrs. Parker, the dam was constructed about 1954. The builder of the dam is unknown. No data or records regarding the design or the construction of the dam are known to exist.

h. Normal Operational Procedure. The lake level is unregulated.

1.3 PERTINENT DATA

a. Drainage Area. The area adjacent to the lake is in various stages of development having been subdivided for residential use. The remaining area is virtually undeveloped and in a natural wooded state. The watershed above the dam amounts to approximately 290 acres. The watershed area is outlined on Plate 3.

b. Discharge to Damsite.

(1) Estimated known maximum flood at damsite ... 75 cfs*

(2) Spillway capacity ... 140 cfs (W.S. = Elev. 810.8)

c. Elevation (Ft. above MSL). The crest of the spillway was assumed to be elevation 808.0; the basis for this assumption being the elevation for the lake surface shown on the 1959 USGS Parker Lake, Missouri, Quadrangle Map, 7.5 minute series.

*Based on an estimate of depth of flow as observed by a representative of the Owner.

(1) Top of dam ... 810.8 (min.)

(2) Normal pool (spillway crest) ... 808.0

(3) Streambed at centerline of dam ... 776±

(4) Maximum tailwater ... Unknown

d. Reservoir.

(1) Length at normal pool (Elev. 808.0) ... 2,000 ft.

(2) Length at maximum pool (Elev. 810.8) ... 2,200 ft.

e. Storage.

(1) Normal pool ... 176 ac. ft.

(2) Top of dam (incremental) ... 51 ac. ft.

f. Reservoir Surface.

(1) Normal Pool ... 17 acres

(2) Top of dam (incremental) ... 4 acres

g. Dam.

(1) Type ... Earthfill

(2) Length ... 420 ft.

(3) Height ... 36 ft.

(4) Top width ... 12 ft.

(5) Side slopes

a. Upstream ... 1v on 1.25h (above waterline)

b. Downstream ... 1v on 1.5h

(6) Cutoff ... No data available

(7) Slope protection

a. Upstream ... Gravel riprap (partial only)

b. Downstream ... Vegetation (unkept)

h. Spillway.

(1) Type ... Uncontrolled, broad-crested weir, trapezoidal section in earth cut

(2) Crest ... Elev. 808.0

(3) Approach channel ... Lake

(4) Exist channel ... Earth cut, trapezoidal section

i. Emergency Spillway. ... None

j. Lake Drawdown Facility. ... None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No engineering data relating to the design of the dam are known to exist.

2.2 CONSTRUCTION

No records of the construction of the dam are known to exist.

2.3 OPERATION

The lake level is uncontrolled, governed by the elevation of the spillway crest. A representative of the Owner stated that the dam had never been overtopped and that the greatest depth of flow at the spillway that could be recalled was estimated to be about 2 feet.

2.4 EVALUATION

a. Availability. Engineering data for assessing the design of the dam and spillway were unavailable.

b. Adequacy. No data available. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions (including earthquake loads) and made a matter of record.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. A visual inspection of the Parker Lake No. 1 Dam was made by Horner & Shifrin engineering personnel, T.K. Deddens, Geological Engineer, H.B. Lockett, Civil Engineer and Hydrologist, and A.B. Becker, Jr., Civil and Soils Engineer, on 11 October 1979. An examination of the dam site was also made by an engineering geologist, Jerry D. Higgings, a consultant retained by Horner & Shifrin for the purpose of assessing the area geology. Also examined at the time of the inspection, was the area below the dam within the potential flood damage zone. Photographs of the dam taken at the time of the inspection are included on Pages A-1 through A-5 of Appendix A. The locations of the photographs taken during the inspection are shown on Plate 4.

b. Area Geology. The dam site lies on the eastern flank of the Ozark Uplift on Ordovician-age sedimentary rock, composed primarily of dolomite, chert and sandstones dipping gently to the east. The dam and lake are founded on the Gasconade formation and its residuum. The Gasconade is predominantly a light brownish gray, crystalline and cherty dolomite with a few thin, irregular sandstone lenses. Cryptozoan, cellular and ropey cherts are common. Bedrock exposures are primarily limited to the spillway channel. the residuum is composed of a red cherty clay, which tends to be relatively permeable and susceptible to erosion.

The abutments are formed by thick cherty clay residuum overlying chert reefs and dolomite. The right abutment is cut by the spillway which exposes a thick section of residuum and cryptozoan chert. At the downstream end of the spillway a resistant ledge of dolomite forms a waterfall and, at the base of the ledge, several active springs emerge from bedding planes in the dolomite.

c. Dam. The visible portions of the upstream and downstream faces of the dam as well as the dam crest (see Photos 1 thru 3) were almost completely covered with trees ranging in size up to 15 inches in diameter and a dense growth of brush. The upstream face of the dam was found to be in an unkept condition covered with tree branches and the exposed roots of trees. In addition, erosion, apparently due to wave action, has created an almost vertical face approximately 2 feet high at the normal waterline. Riprap, consisting of stone and concrete rubble up to about 12 inches in size was present on the upstream face. However, the slope was not uniformly covered as most of the material was concentrated toward the lower portion of the slope. No animal burrows were noted, but due to the dense growth of brush and trees that exists on the dam, it could not be concluded that none existed. No cracking or misalignment of the dam crest was noticed nor were any slides, settlements, or sinkholes observed in the accessable areas of the dam. It should be noted that due to the dense cover of trees and brush on the dam a good portion of the dam could not be thoroughly examined and the non-existence of slides, settlements, etc., in these areas could not be confirmed.

Seepage, on the order of 2 gpm, was observed at the right side of the dam emerging from cracks and fissures in the ledge rock at the end of the spillway outlet channel, and from an area about 20 feet in diameter at the end of the rock outcrop (see Photo 7) of the ledge, where flow was estimated to be approximately 8 to 10 gpm. Flow from a spring in the hillside about 30 feet downstream of the ledge was estimated at between 15 and 20 gpm. Seepage was also observed at the left side of the embankment where a marshy area (see Photo 9) approximately 100 feet long by 25 feet wide exists. A similar seepage area, characterized by soft ground, standing water, cattails and tall grass (see Photo 8), was noticed near the center of the dam. Combined flow from these areas was estimated at about 8 to 10 gpm. Since the entire downstream area was overgrown with a dense growth of brush and trees, there may be other areas below the dam where seepage is occurring that went unnoticed during the inspection. Collected drainage within the 24-inch corrugated metal pipe culvert (see Photo 10) that crosses the road approximately 500 feet

downstream of the dam was estimated to be flowing at a rate of about 250 gpm. Since a sulpher spring is also located in the area upstream of the culvert, it could not be determined how much of the flow in the culvert was due to seepage alone. However, it is believed likely that roughly one-half of the flow could be attributed to leakage from the lake. It was noted that all flows from seepage areas were clear, carrying no suspended solids or sediment load.

The spillway, a trapezoidal section excavated into the hillside at the right abutment, curling around the embankment and discharging over the rock ledge (see Photo 4) into the valley below, was found generally, to be in an unkept condition. The spillway crest and the invert of the spillway channel were covered with variable-sized gravel and sparse vegetation. The spillway channel side slopes (see Photo 5) were jagged and eroded standing at a near vertical slope with the roots of trees projecting into the channel. No significant erosion or scouring of the channel bottom was evident at the base of the rock ledge located at the downstream end of the improved channel section. Downstream of the rock ledge, the spillway channel, an unimproved section, was congested with small trees and dense brush.

d. Appurtenant Structures. No appurtenant structures were observed at this dam site.

e. Downstream Channel. The channel, Jordan Branch, downstream of the dam is unimproved. At a location about 500 feet below the dam, a 24-inch corrugated metal pipe culvert allows stream flow to cross a road that accesses the east side of Parker Lake No. 2. The channel section that lies between the dam and the culvert was found to be congested with trees and brush. The channel joins the upstream end of Parker Lake No. 2 approximately 1,500 feet below the dam and the South Fork of Saline Creek about 3 miles below the dam.

f. Reservoir. Numerous small homes and associated buildings may be found in the area adjacent to the lake. The lake shoreline is grass covered and tree lined and, with the exception of the dam area, appeared

to be reasonably well maintained. At the time of the inspection the lake surface was about 10 feet below the normal pool level leaving much of the normally inundated ground at the upstream end of the lake exposed. Where the lake bed was exposed it was mostly covered with weeds. The amount of sediment within the lake could not be determined at the time of the inspection.

3.2 EVALUATION

Due to the poor condition of the dam, the deficiencies observed and noted herein are considered of significant importance to warrant prompt remedial action. It is recommended that the trees and brush be removed from the embankment as indicated in paragraph 7.2b(1) and, that the entire dam be re-examined after it is cleared for additional signs of seepage and erosion as well as other indications of instability.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The spillway is uncontrolled. The water surface level is governed by precipitation runoff, evaporation, seepage, and the capacity of the uncontrolled spillway.

4.2 MAINTENANCE OF DAM

A representative of the Owner, stated that to the best of his knowledge, since construction of the structure in 1954, there has been no maintenance work performed on the dam.

4.3 MAINTENANCE OF OUTLET OPERATING FACILITIES

No outlet operating facilities exist at this dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEMS IN EFFECT

The inspection did not reveal the existence of a dam warning system.

4.5 EVALUATION

Lack of maintenance is considered detrimental to the safety of the dam. It is recommended that maintenance of the dam be undertaken on a regular basis and that records be kept of all maintenance work performed.

5.1 EVALUATION OF FEATURES

a. Design Data. Design data are not available.

b. Experience Data. The drainage area and lake surface area were developed from the 1959 USGS Parker Lake, Missouri, Quadrangle Map. The proportions and dimensions of the spillway and dam were developed from surveys made during the inspection.

c. Visual Observations.

(1) The spillway consists of a nearly trapezoidal, broad-crested earth section cut into the hillside at the right abutment.

(2) The spillway channel is defined by the nearly vertical, jagged side slopes of the stoney clay hillside. The invert of the channel consists of earth and variable sized chert gravel and sparce vegetation. The spillway discharges over a rock ledge onto the valley floor, about 10-to 12-feet below the ledge.

(3) No emergency spillway is provided.

(4) No drawdown facilities are provided to dewater the lake.

d. Overtopping Potential. The spillway is inadequate to pass the probable maximum flood or 1/2 the probable maximum flood without overtopping the dam. For all practical purposes the spillway section is adequate to pass the 1 percent chance (100-year frequency) flood without overtopping the dam. The results of a dam overtopping analysis are as follows:

Ratio of PMF	Q-Peak Outflow (cfs)	Max Lake W.S. Elev.	Max. Depth of Flow over Dam (Elev. 810.8)	Duration of Overtopping of Dam (Hours)
0.12	140	810.8*	0.01	0.4
0.50	2,573	812.6	1.8	7.3
1.00	5,436	813.7	2.9	10.0
100-Yr. Flood	140	810.8*	0.01	0.3

Elevation 810.8 was found to be the low point in the dam crest. The flow safely passing the spillway just prior to overtopping amounts to approximately 140 cfs, which is equivalent to about 12 percent of the probable maximum flood inflow and the outflow from the 1 percent chance (100-year frequency) flood. At peak flow of the probable maximum flood the maximum depth of the flow over the dam would be 2.9 feet and the overflow would extend along the entire length of the dam.

e. Evaluation. Inspection of the existing spillway channel indicated that the material (brown, gravelly, silty clay) can under certain conditions, such as high velocity flow, be very erodible. An examination of the dam indicated that the material used to construct the embankment is similar to that observed in the spillway channel. For the PMF condition where the depth of flow overtopping the dam and duration of flow over the dam are appreciable (maximum of 2.9 feet for a duration of 10.0 hours), damage by erosion to the dam crest and downstream face is expected. The extent of these damages are not predictable; however, it is possible that they may result in failure of the dam.

f. References. Procedures and data for determining the probable maximum flood, the 100-year frequency flood, and the discharge rating curve for flow over the spillway and dam crest are presented on Pages B-1 and B-2 of the Appendix. A listing of the HEC-1 (Dam Safety Version) input data is shown on Pages B-3 and B-4 of the Appendix. A copy of the computer output table entitled "Summary of Dam Safety Analysis" is presented on Page B-5 and the inflow and outflow hydrographs for the

*To nearest one-tenth foot.

probable maximum flood are shown on Page B-5 of the Appendix. Area-storage volume curves for the reservoir are shown on Plate 6 and a spillway rating curve is presented on Plate 7.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. Visual observations of conditions which adversely affect the structural stability of the dam are discussed in Section 3, paragraph 3.1c.

b. Design and Construction Data. Design or construction data relating to the structural stability of the dam were not available for review.

c. Operation Records. No appurtenant structures or facilities requiring operation exist at this dam.. According to a representative of the Owner, no records are kept of lake level, spillway discharge, dam settlement, or seepage.

d. Post Construction Changes. According to a representative of the Owner, no post construction changes were made which would affect the structural stability of the dam.

e. Seismic Stability. This dam is located in Seismic Zone II, however it is located very near the boundary between Seismic Zones II and III. Since the dam is located in Seismic Zone II and in the proximity of Seismic Zone III, it is possible that an earthquake could occur of significant intensity to cause severe damage or failure of the dam.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety. A hydraulic analysis indicated that the spillway is capable of passing lake outflow of about 140 cfs without the level of the lake exceeding the low point in the top of the dam. A hydrologic analysis of the lake watershed area, as discussed in Section 5, paragraph 5.1d, indicated that for a storm runoff of probable maximum flood magnitude, the lake outflow would be on the order of 5,436 cfs, and that for the 1 percent chance (100-year frequency) flood, the lake outflow would be about 140 cfs.

Several items were noticed during the visual inspection that adversely affect the safety of the dam. These items include seepage, trees, dense brush, and erosion of the upstream face of the dam.

Stability and seepage analyses of the dam were not available for review and therefore no judgment could be made with respect to the structural stability of the dam.

b. Adequacy of Information. Due to lack of engineering and construction data, the assessments reported herein were based on external conditions as determined during the visual inspection. The assessment of the hydrology of the watershed and capacity of the spillway were based on a hydrologic/hydraulic study as indicated in Section 5. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency.

c. Urgency. The items concerning the safety of the dam noted in paragraph 7.1a and the remedial measures recommended in paragraph 7.2 should be accomplished without delay.

d. Necessity for Phase II. Based on the results of the Phase I inspection, a Phase II investigation is not recommended.

e. Seismic Stability. This dam is located in Seismic Zone II, however it is located very near the boundary between Seismic Zones II and III. Since the dam is located in Seismic Zone II and in the proximity of Seismic Zone III, it is possible that an earthquake could occur of significant intensity to cause severe damage or failure of the dam.

7.2 REMEDIAL MEASURES

a. Recommendations. The following actions are recommended:

(1) Based upon criteria set forth in the recommended guidelines, alterations to the design of the dam should be made in order to pass lake outflow resulting from a storm of probable maximum flood magnitude.

(2) Obtain the necessary soil data and perform dam stability and seepage analyses in order to determine the structural stability of the dam for all operational conditions. Seepage and stability analyses should be performed by a qualified professional engineer experienced in the design and construction of dams.

b. Operations and Maintenance (O & M) Procedures. The following O & M procedures are recommended:

(1) Remove the trees and brush from the dam proper and the areas adjacent to the downstream toe of slope. The removal of trees should be performed under the direction and guidance of an engineer experienced in the design and construction of earthen dams, since indiscriminate clearing can jeopardize the safety of the dam. Once the dam and adjacent downstream area are cleared of trees and brush, they should be thoroughly examined by an engineer for seepage, erosion,

sloughing and other signs of instability. The existing turf cover should be restored if destroyed or missing. Maintain the turf cover at a height that will not hinder inspection of the embankment or provide cover for burrowing animals. Holes from tree roots and voids created by burrowing animals can provide a pathway for seepage that could lead to a piping condition (progressive internal erosion) and potential failure of the dam.

(2) Provide some means of controlling seepage at the downstream face of the dam in order to prevent a piping condition which can result in failure of the dam.

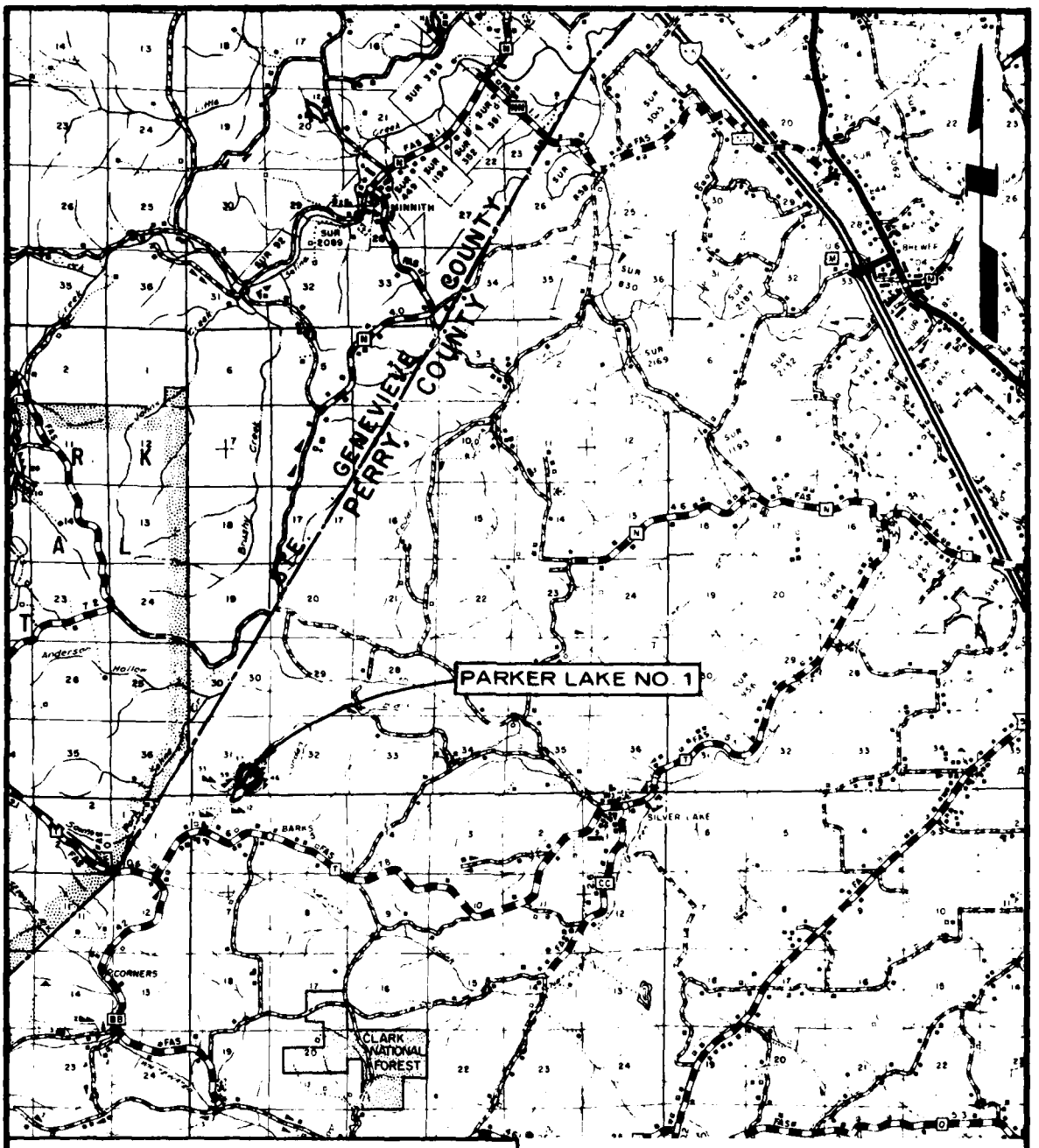
(3) Drain the low lying areas adjacent to the base of the dam in order to eliminate soft ground and other conditions unfavorable to the stability of the embankment.

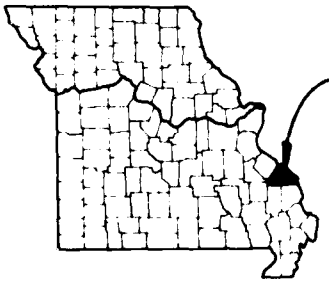
(4) Restore the eroded areas of the spillway channel and provide some form of protection particularly along the dam side of the channel in order to prevent erosion of embankment materials by spillway flow.

(5) Restore, where required, the upstream face of the dam and provide some form of protection (other than grass) for the dam face at and above the normal waterline in order to prevent erosion of the embankment by wave action or fluctuations of the lake level.

(6) Provide maintenance of all areas of the dam and spillways on a regularly scheduled basis in order to insure features of being in satisfactory operating condition.

(7) A detailed inspection of the dam should be instituted on a regular basis by an engineer experienced in the design and construction of dams. It is also recommended that records be kept for future reference of all inspections made and remedial measures taken.





LOCATION MAP

PARKER LAKE NO. 1

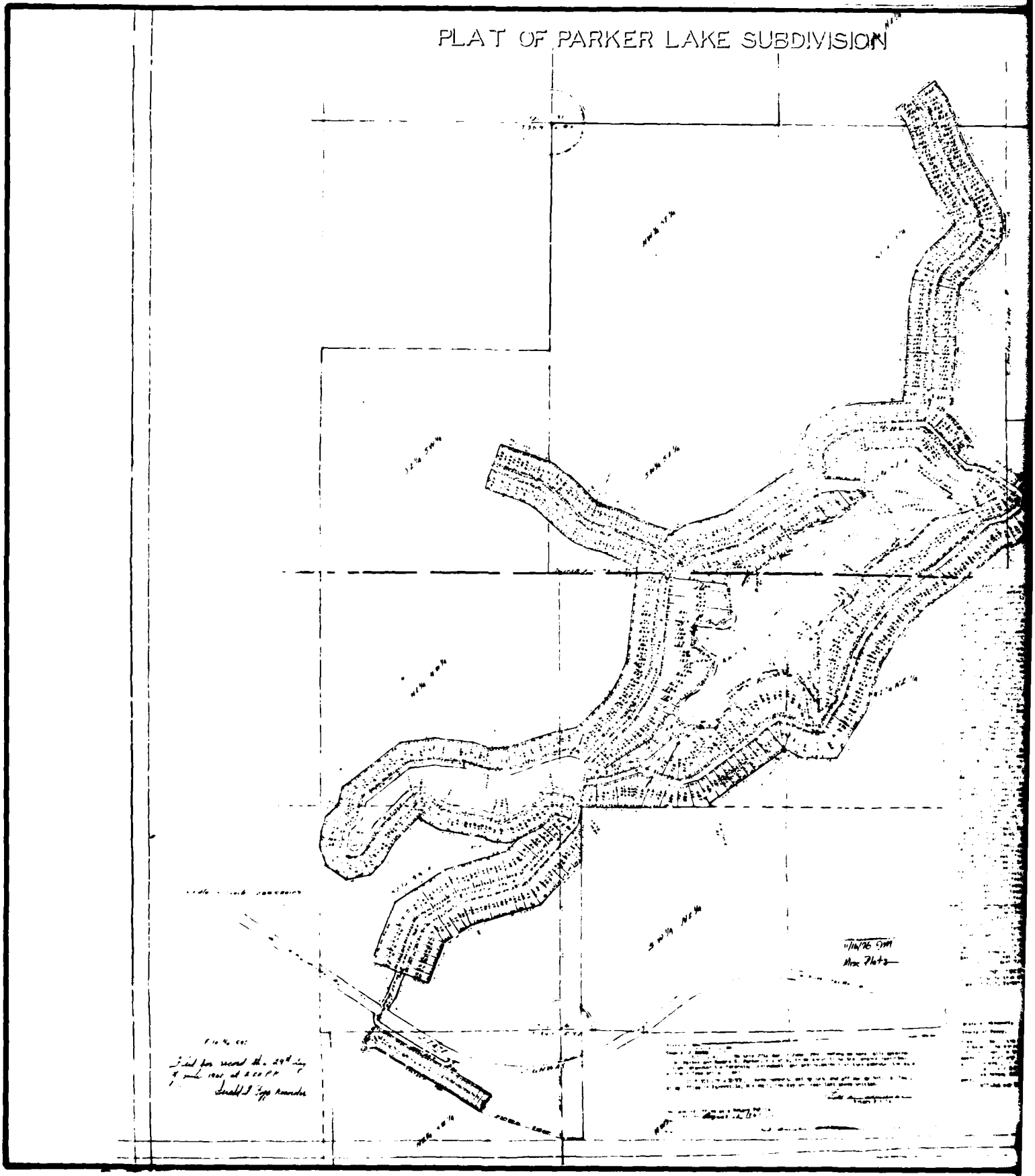
1 0 1 2 3 4

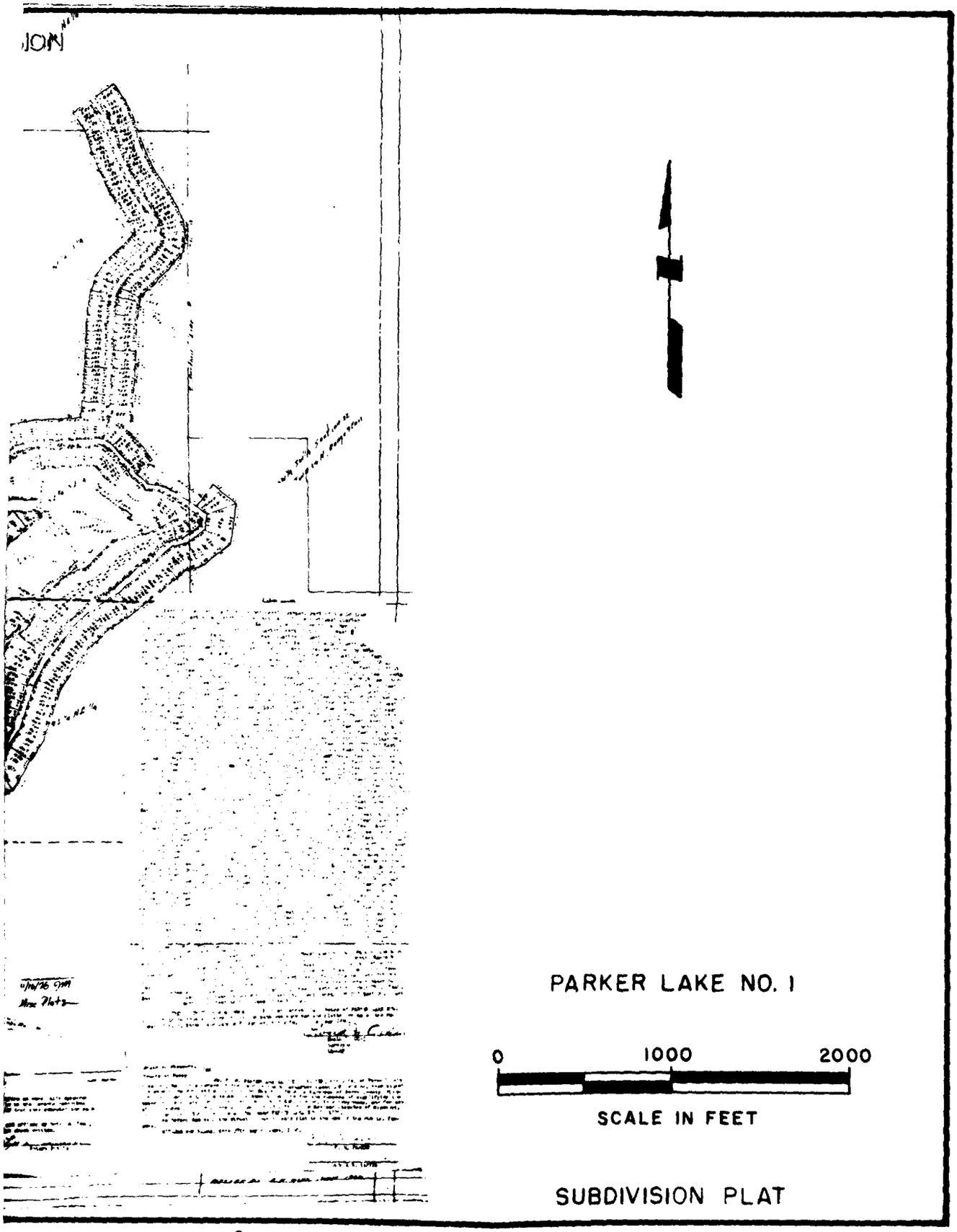
SCALE (MILES)

REGIONAL VICINITY MAP

PLATE 1

PLAT OF PARKER LAKE SUBDIVISION





1 2

PLATE 2

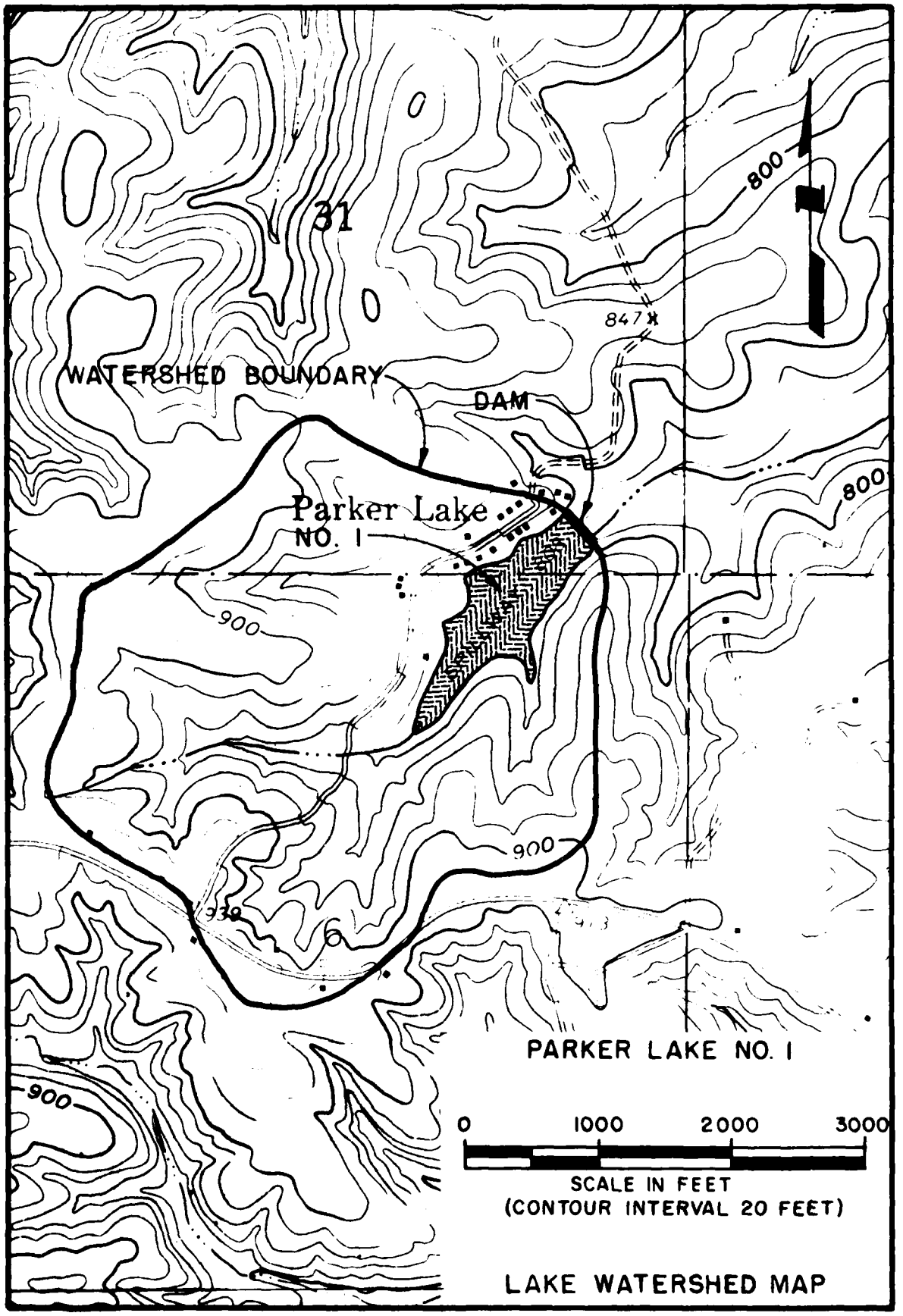
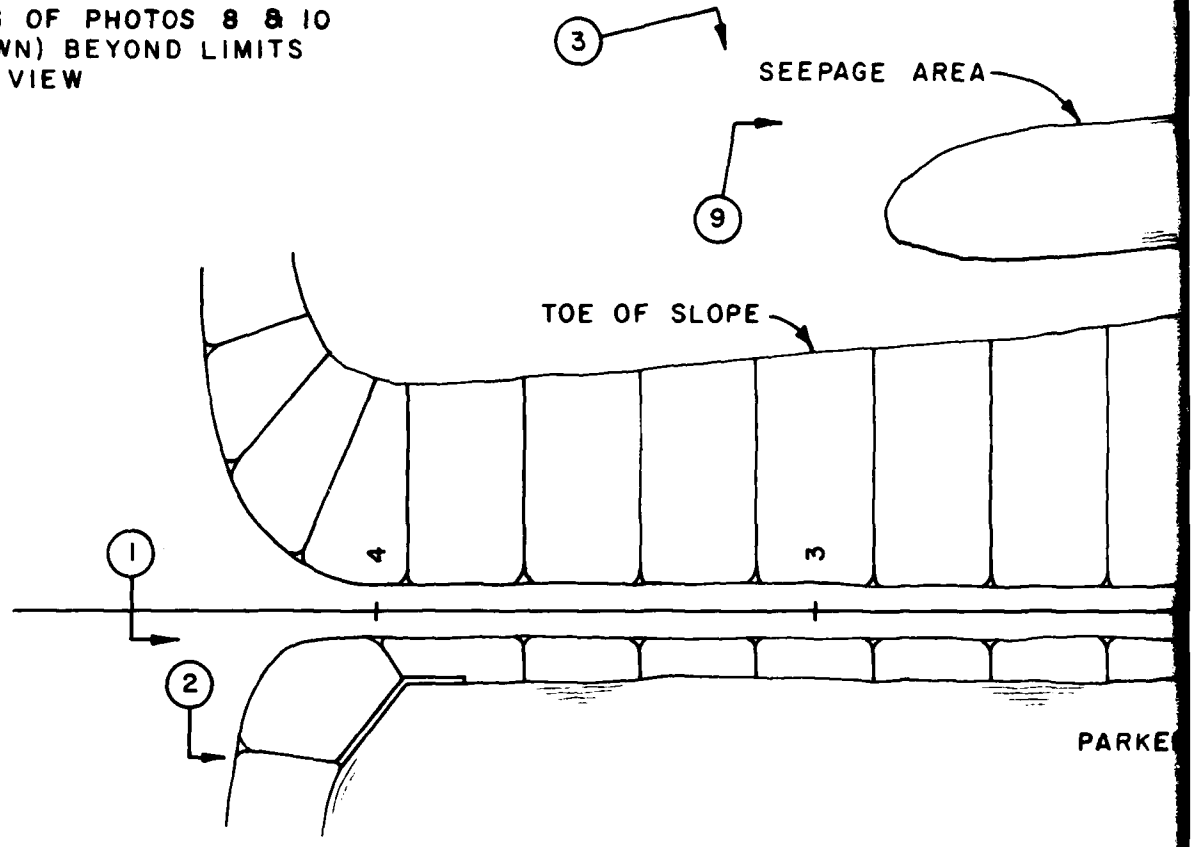
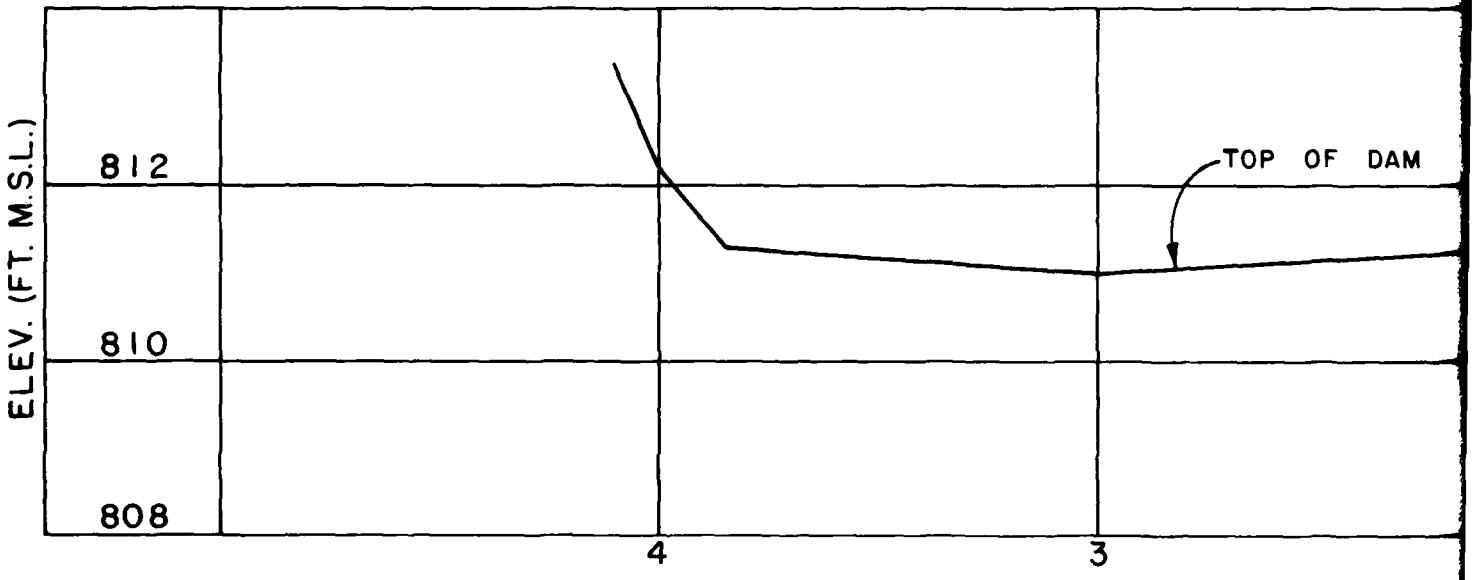

31
800
847
WATERSHED BOUNDARY
DAM
Parker Lake
NO. 1
800
900
900
900
PARKER LAKE NO. 1
0
1000
2000
3000
SCALE IN FEET
(CONTOUR INTERVAL 20 FEET)
LAKE WATERSHED MAP

PLATE 3

NOTE: LOCATIONS OF PHOTOS 8 & 10 (NOT SHOWN) BEYOND LIMITS OF PLAN VIEW

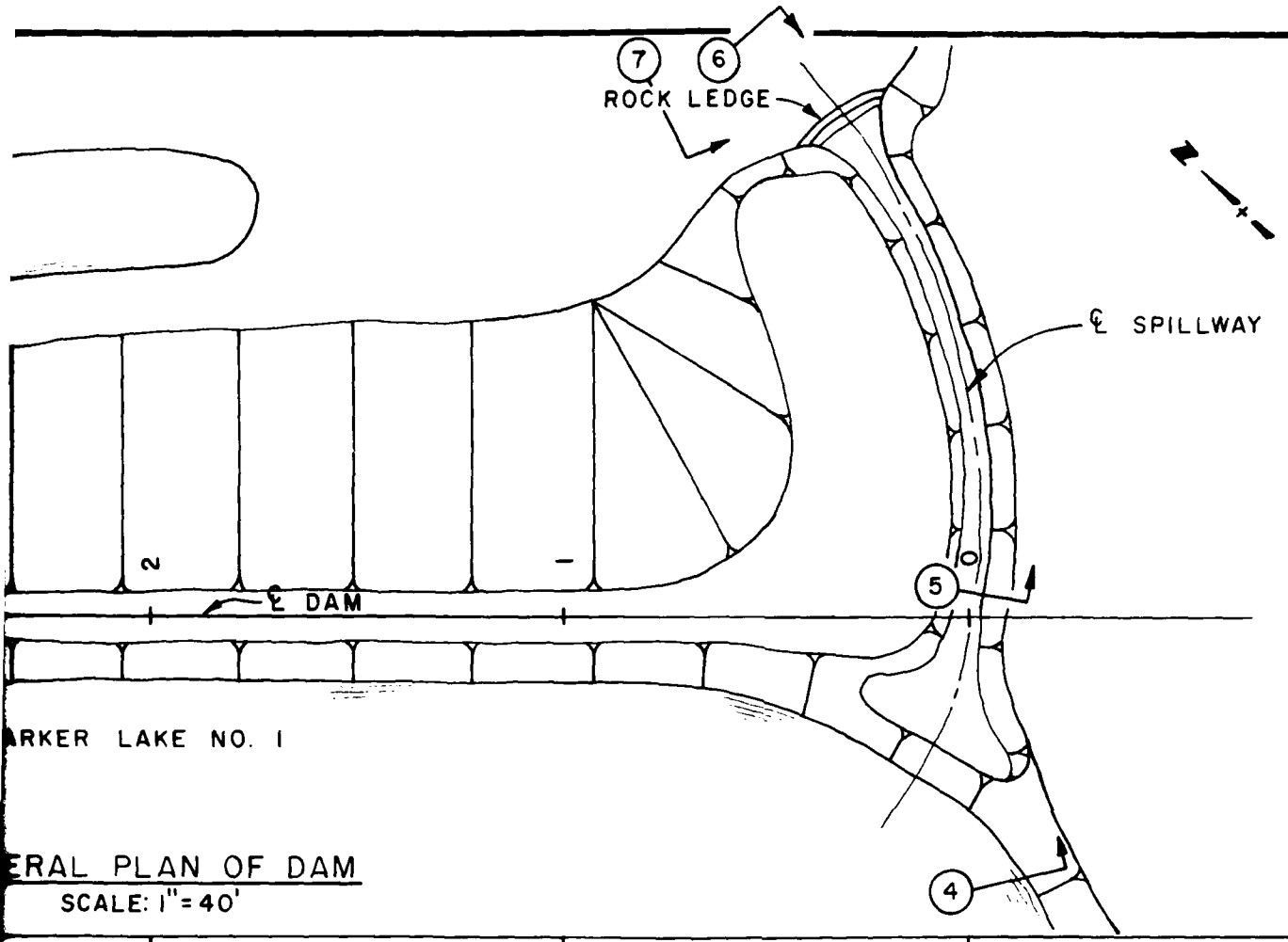


GENERA
S



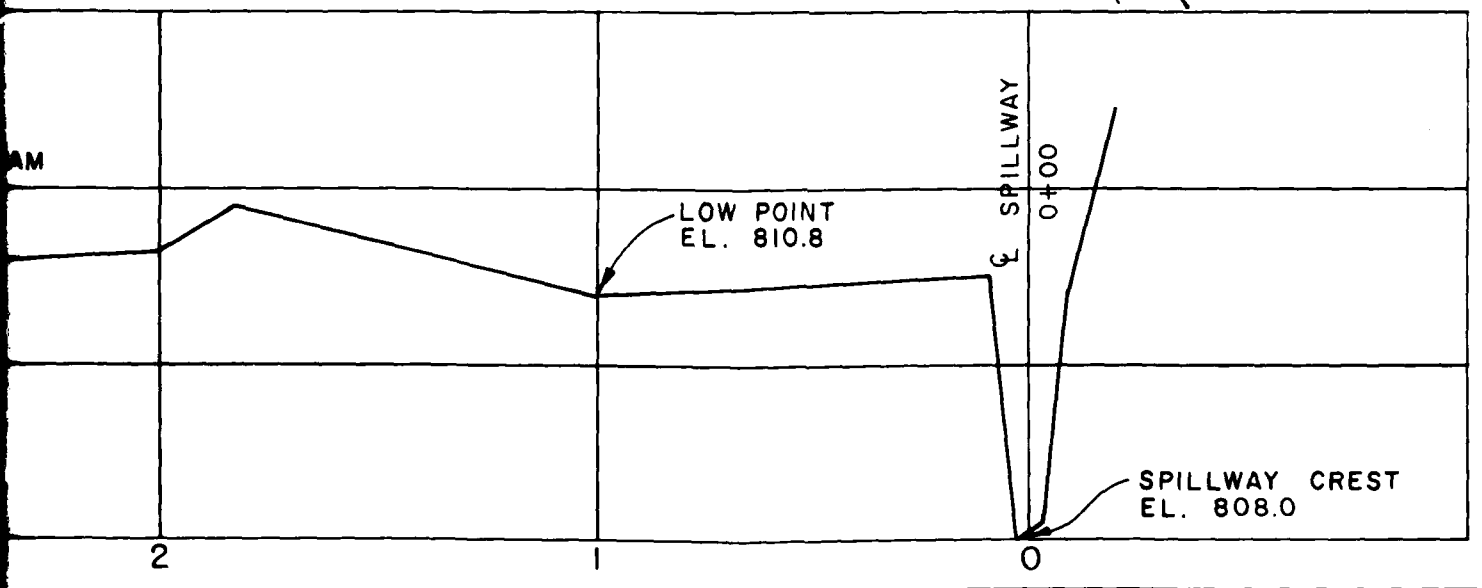
PROFI
SCAL

6
PHOTO LOCATION & KEY (SEE APPENDIX A)



RKER LAKE NO. 1

ERAL PLAN OF DAM
SCALE: 1"=40'



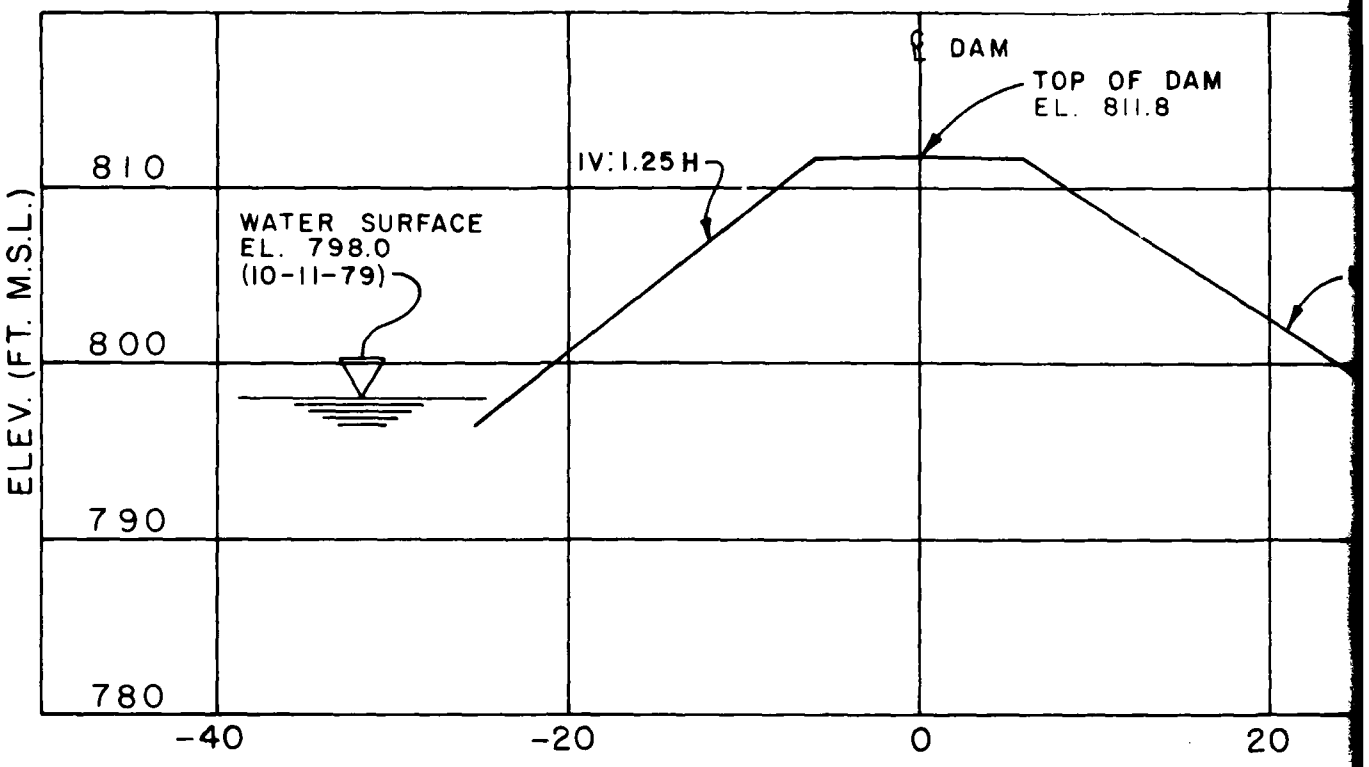
OFILE DAM CREST
CALES: 1"=2'V., 1"=40'H.

PARKER LAKE NO. 1
DAM PLAN & PROFILE

Horner & Shifrin, Inc. Nov. 1979

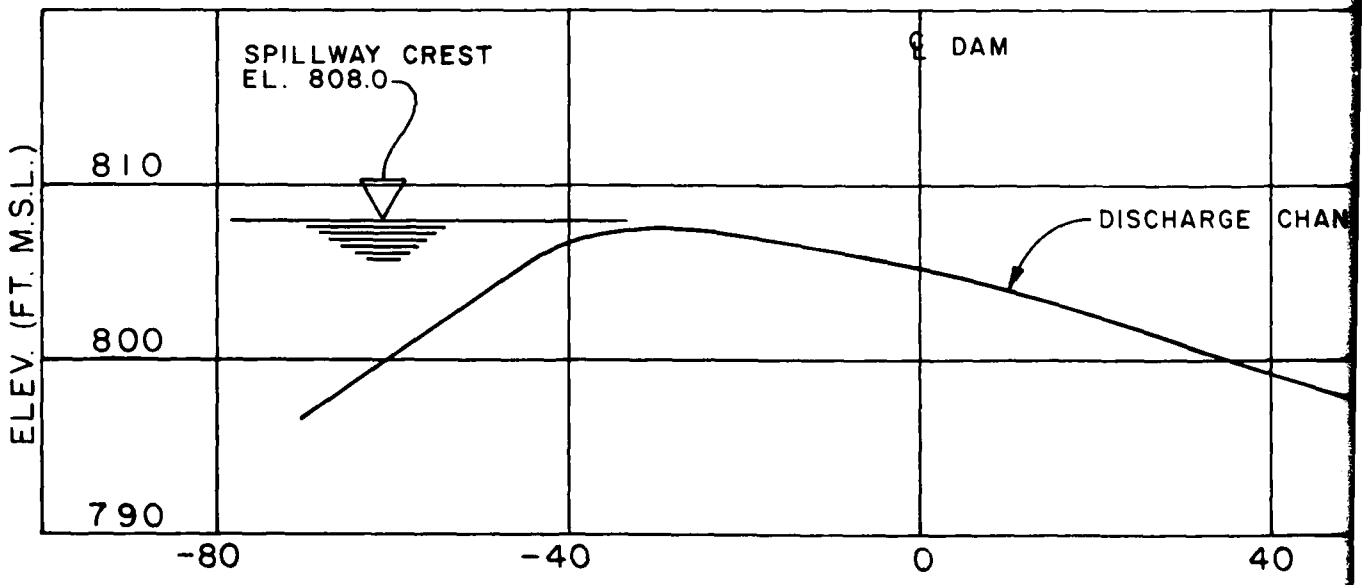
1 2

PLATE 4



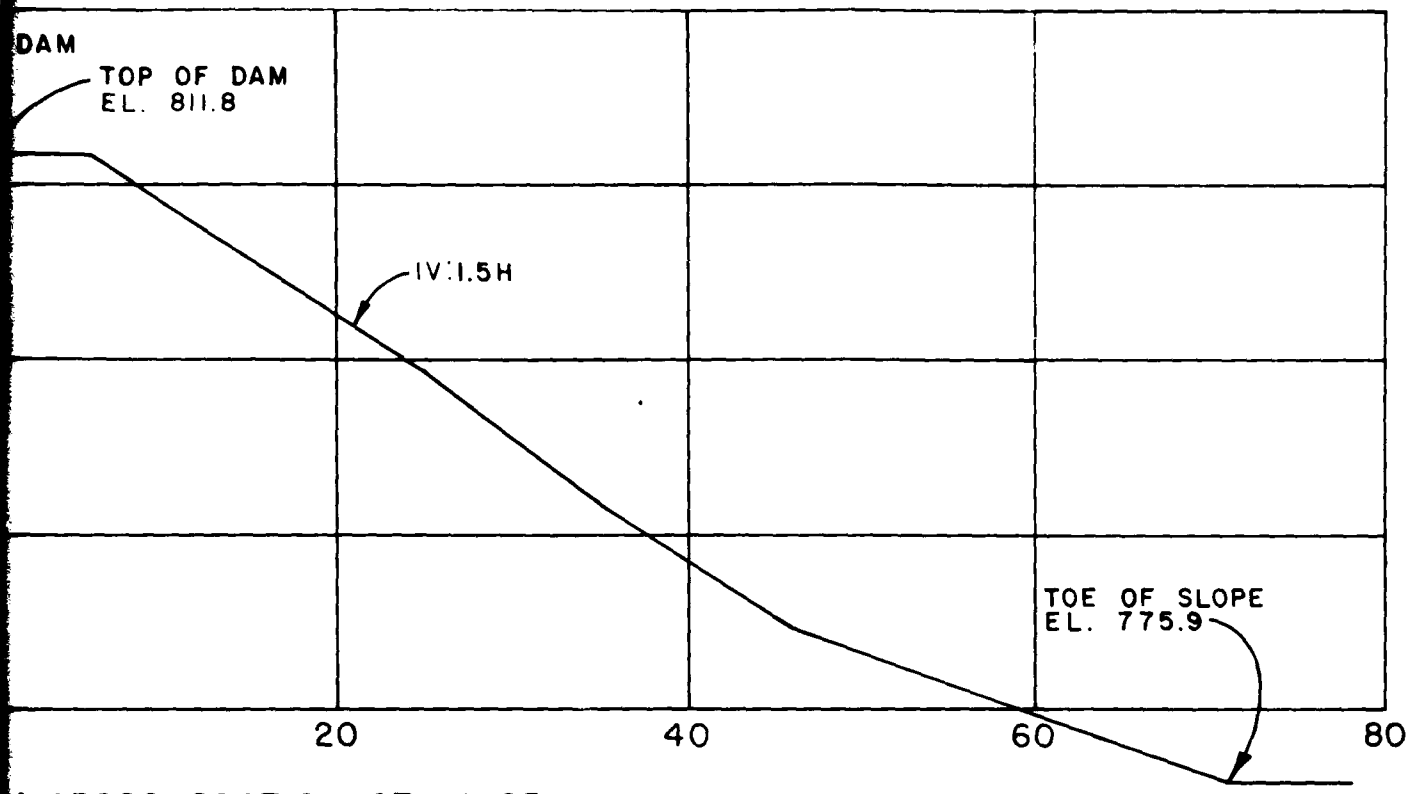
DAM CROSS SECTION ST

SCALES: 1"=10'V., 1"=10'H.



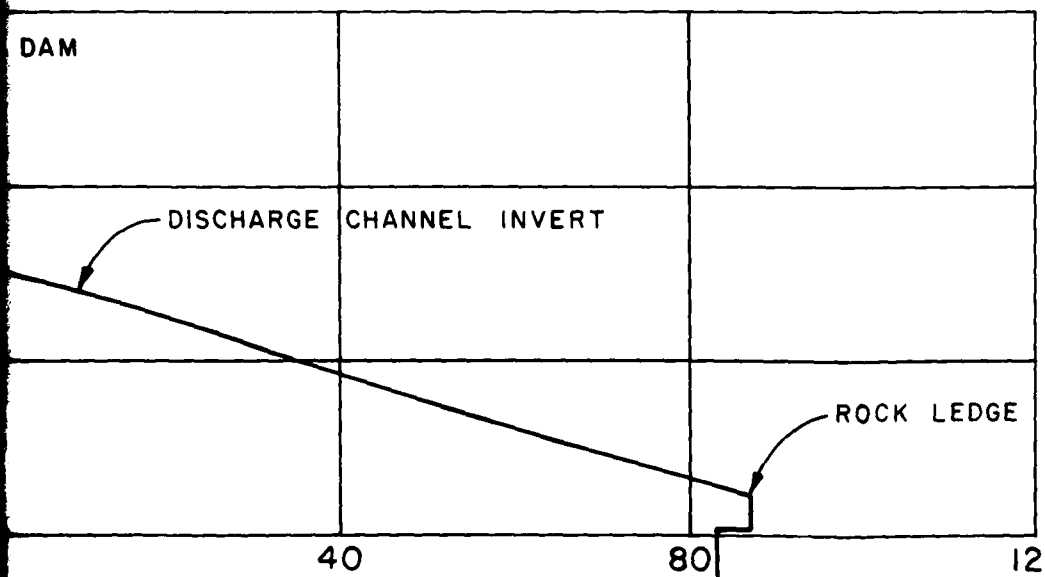
PROFILE SPILLWAY ℄

SCALES: 1"=10'V., 1"=20'H.



M CROSS SECTION STA. 1+83

SCALES: 1"=10'V., 1"=10' H.

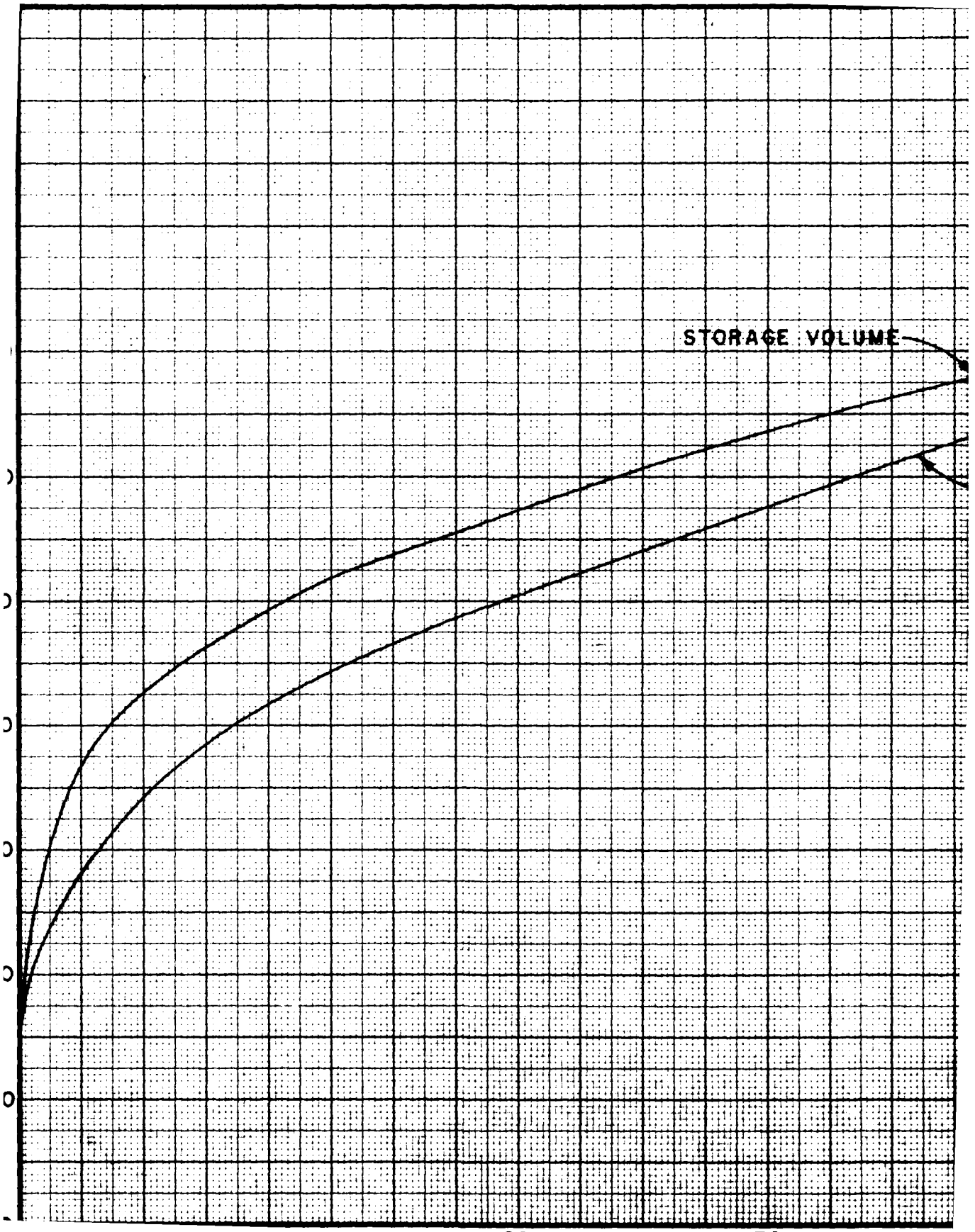


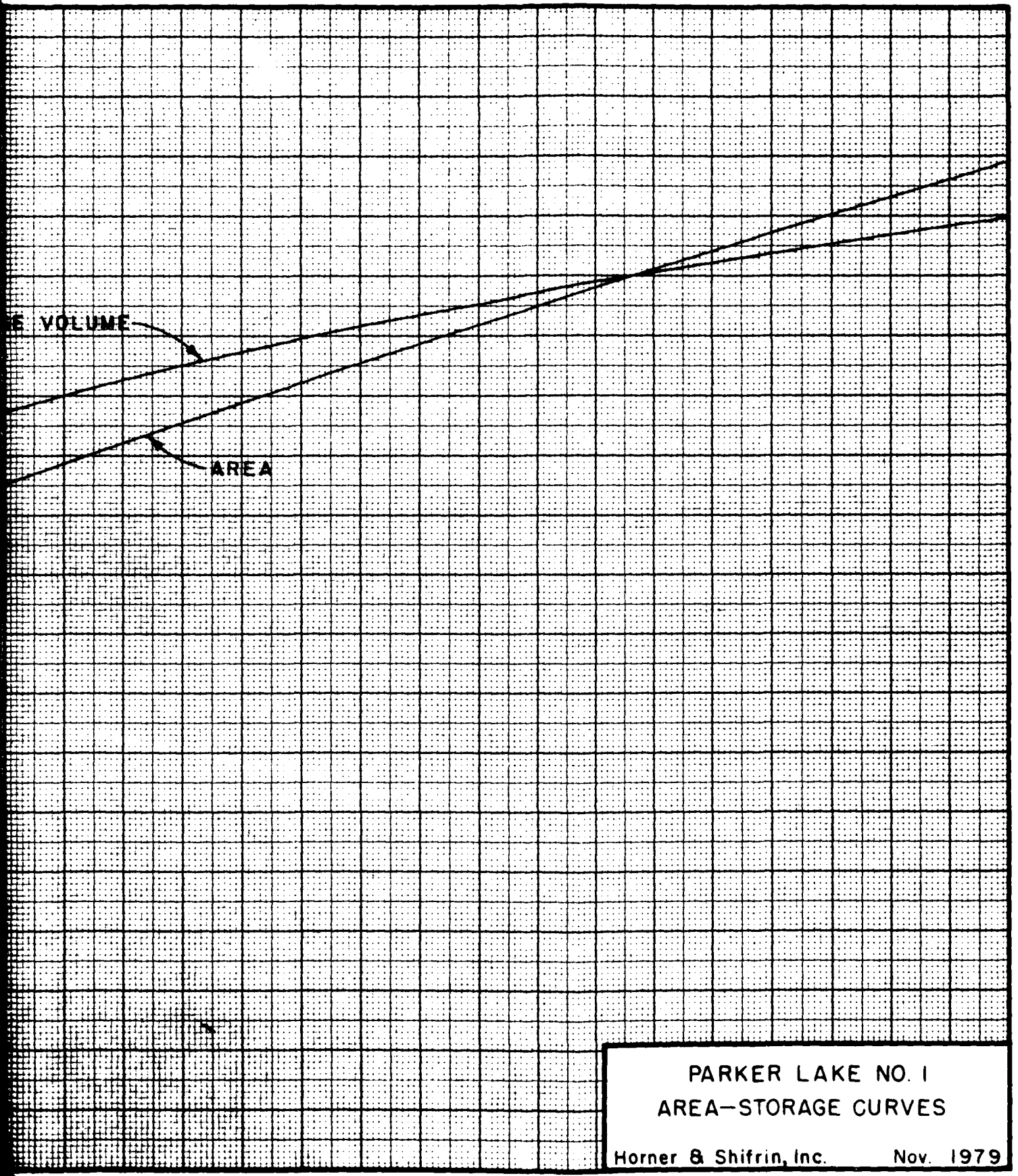
E SPILLWAY ℄

:1"=10'V., 1"=20'H.

PARKER LAKE NO. 1
DAM CROSS-SECTION &
SPILLWAY PROFILE
Horner & Shifrin, Inc. Nov. 1979

PLATE 5


STORAGE VOLUME

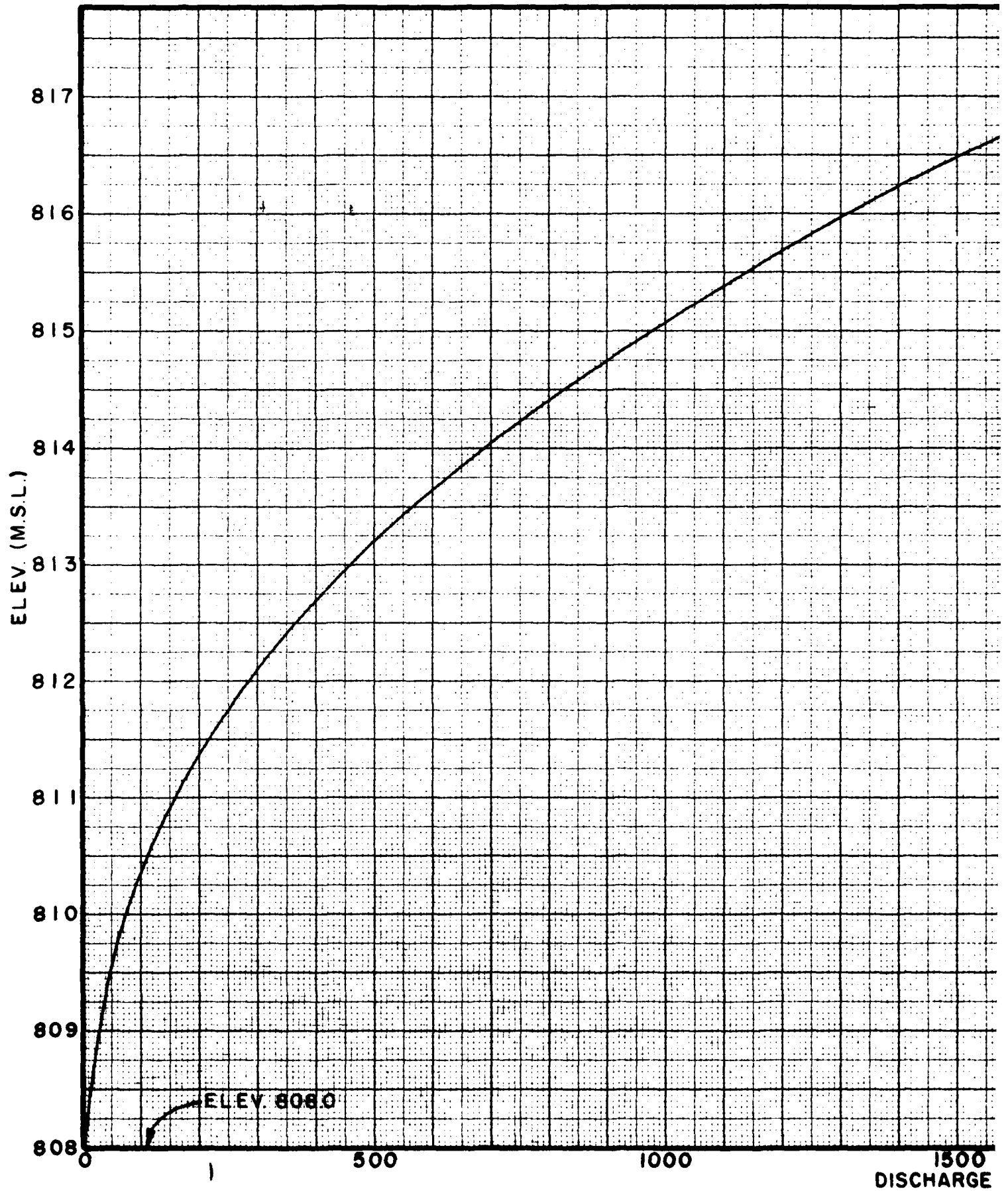


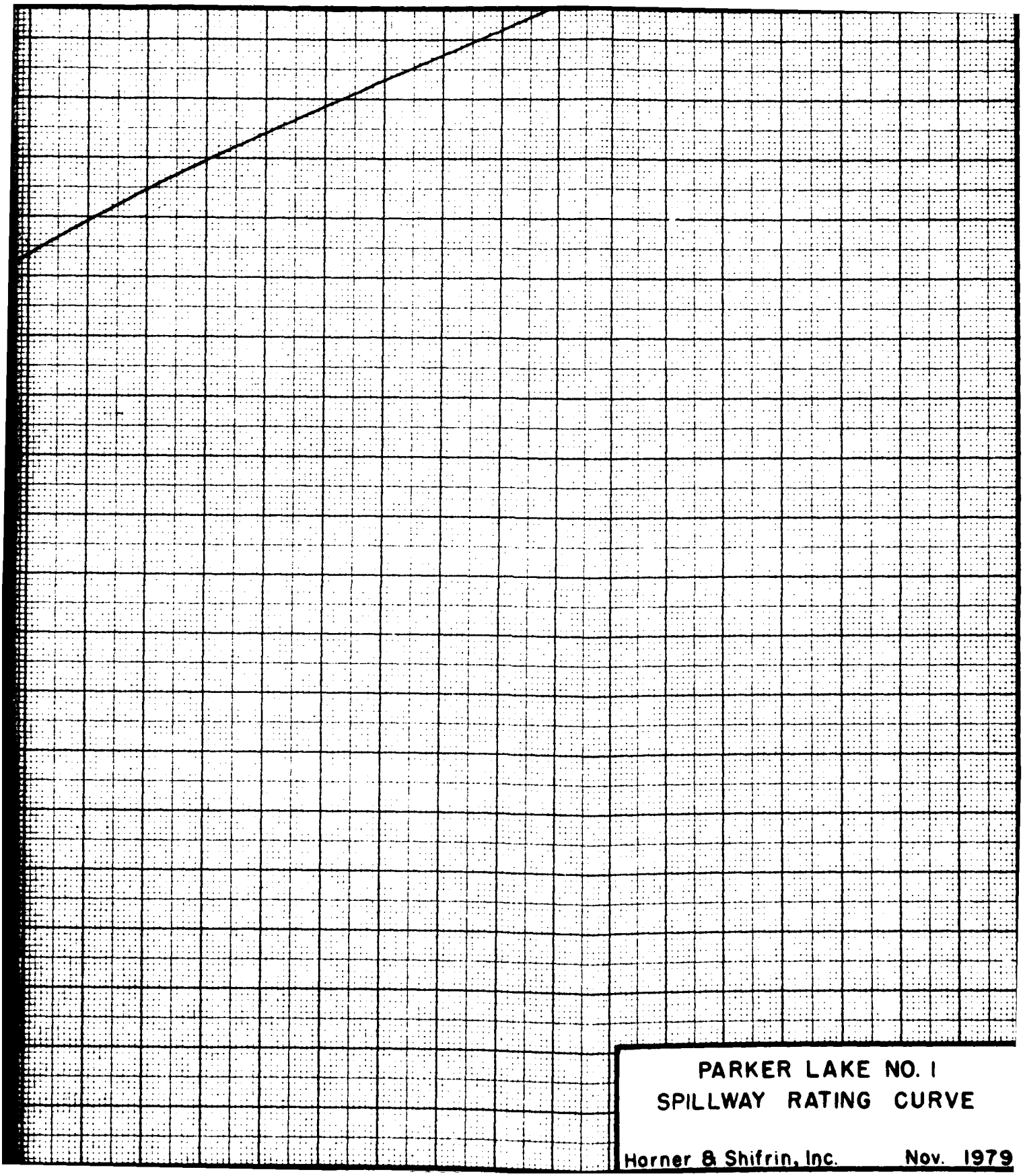
PARKER LAKE NO. 1
AREA–STORAGE CURVES

Horner & Shifrin, Inc. Nov. 1979

0 AREA (ACRES) 40 50 60
0 VOLUME (ACRE-FT.) 800 1000 1200

PLATE 6


817
816
815
814
813
812
811
810
809
808
ELEV. (M.S.L.)
ELEV. 808.0
0
500
1000
1500
DISCHARGE



PARKER LAKE NO. 1
SPILLWAY RATING CURVE

Horner & Shifrin, Inc. Nov. 1979

APPENDIX A

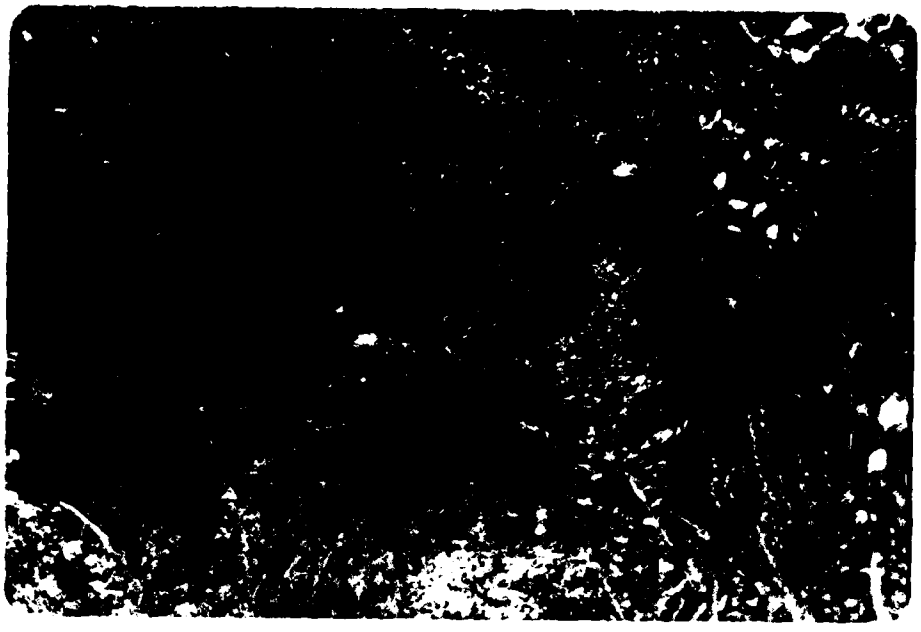
INSPECTION PHOTOGRAPHS

NO. 1: DAM CREST

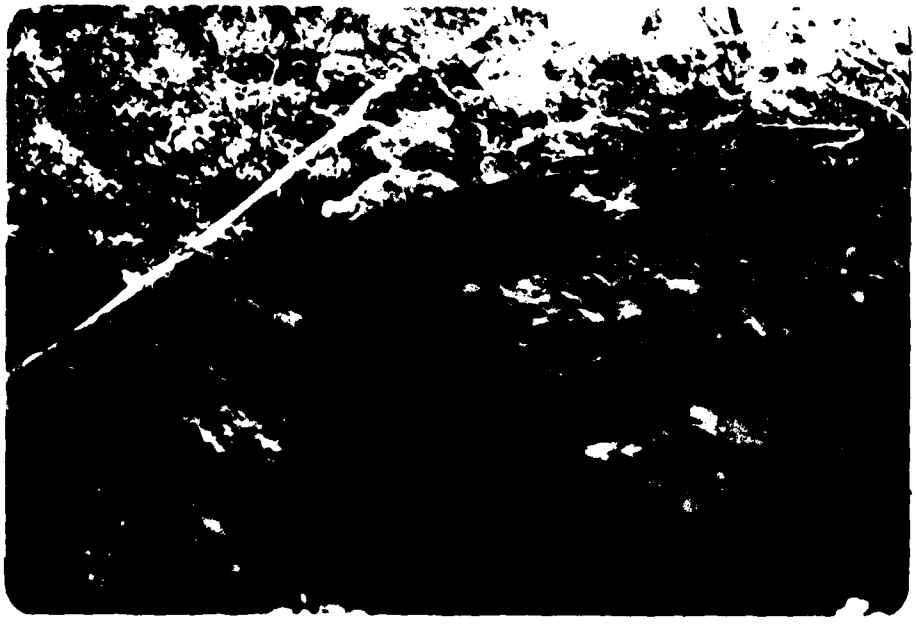
NO. 2: UPSTREAM FACE OF DAM

NO. 3: DOWNSTREAM FACE OF DAM

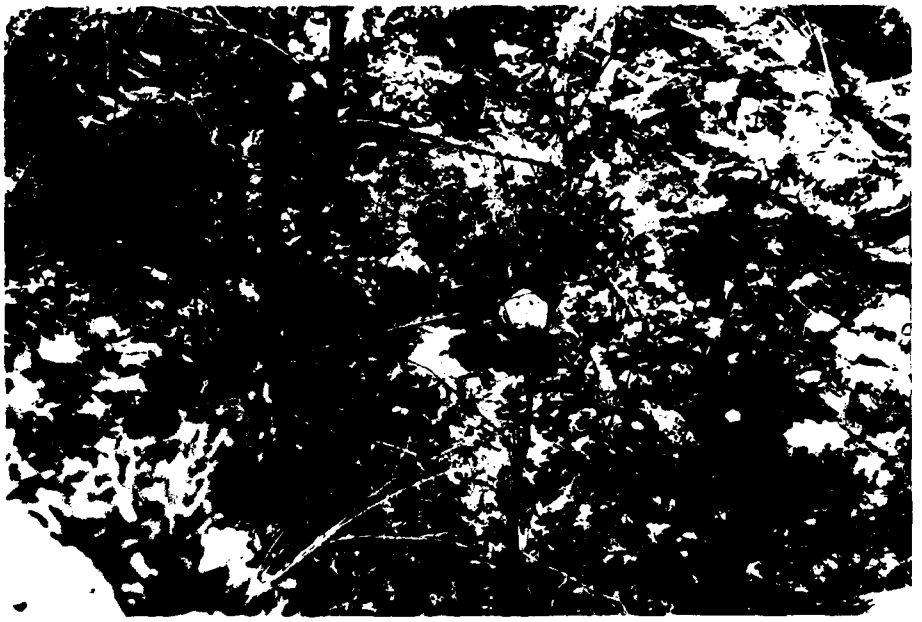
NO. 4: SPILLWAY CREST (LOOKING DOWNSTREAM)



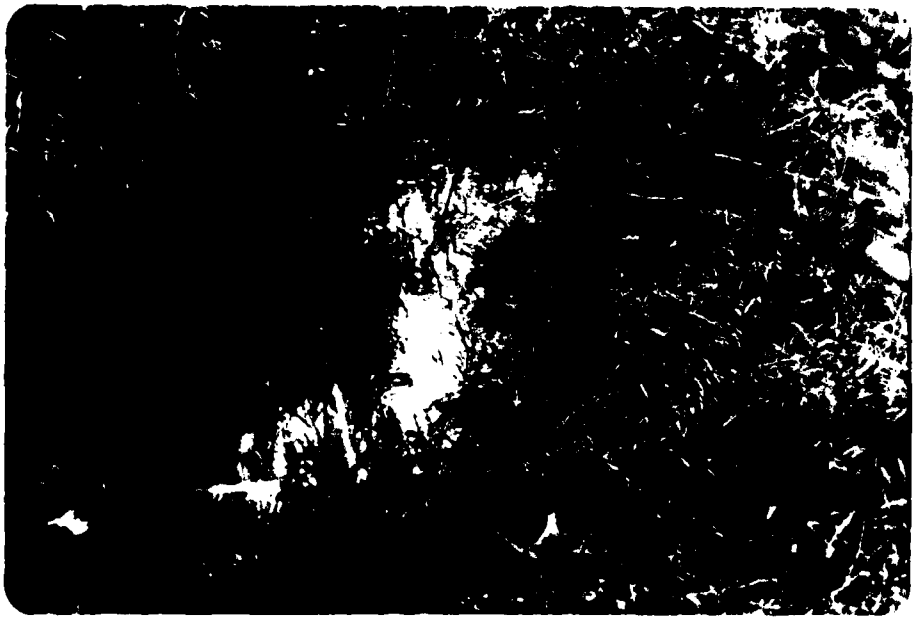
NO. 5: SPILLWAY CHANNEL BELOW CREST (LOOKING DOWNSTREAM)



NO. 6: ROCK LEDGE IN SPILLWAY CHANNEL



NO. 7: SEEPAGE FLOW BELOW ROCK LEDGE



NO. 8: SEEPAGE FLOW BELOW CENTER OF DAM

NO. 9: SEEPAGE AREA BELOW LEFT SIDE OF DAM

NO. 10: DOWNSTREAM END OF 24" CMP CULVERT

APPENDIX B

HYDROLOGIC AND HYDRAULIC ANALYSES

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

1. The HEC-1 Dam Safety Version (July 1978, Modified 26 February 1979) program was used to develop inflow and outflow hydrographs and dam overtopping analyses, with hydrologic inputs as follows:

a. Probable maximum precipitation (200 sq. mile, 24-hour value equals 26.5 inches) from Hydrometeorological Report No. 33. The precipitation data used in the analysis of the 1 percent (100-year frequency) flood was provided by the St. Louis District, Corps of Engineers.

b. Drainage area = 0.45 square miles = 290 acres.

c. SCS parameters:

Lag Time = 0.60 (T_c) = 0.19 hours
Soil Group C = 100 percent
Soil type CN = 84 (AMC III, PMP condition)
= 68 (AMC II, 100-yr condition)
Time of Concentration (T_c) = $\left(\frac{11.9L^3}{H}\right)^{0.385}$

Where: T_c = Travel time of water from hydraulically most distant point to point of interest, hours
L = Length of longest watercourse, miles
H = Elevation difference, feet.

2. The spillway section consists of a broad-crested, trapezoidal section for which conventional weir formulas do not apply.

Spillway release rates were determined as follows:

a. Spillway crest section properties (area, "a" and top width, "t") were computed for various depths, "d."

b. It was assumed that flow over the spillway crest would occur at critical depth. Flow at critical depth was computed as $Q_c = \left(\frac{d^{1.5}}{f}\right)^{0.5}$ for the various depths, "d." Corresponding velocities (v_c) and velocity heads (H_{vc}) were determined using conventional formulas.

c. Static lake levels corresponding to the various values passing the spillway were computed as critical depths plus critical velocity head ($d_c + H_{vc}$), and the relationship between lake level and spillway discharge was thus obtained. The procedure neglects the minor insignificant friction losses across the length of the spillway.

d. Spillway discharge values for equal elevations were selected for entry on the Y4 and Y5 cards.

3. The profile of the dam crest is irregular and flow over the dam cannot be determined by conventional weir formulas. Crest length and elevation data for the dam crest proper were entered into the HEC-1 Program on the $L and the $V cards. The program computes internally the flow over the dam crest and adds this flow to the flow over the spillway as entered on the Y4 and Y5 cards.

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SUMMARY OF DAM SAFETY ANALYSIS

RATIOS OF PMF

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	808.00	808.00	810.80
STORAGE	176.	176.	227.
OUTFLOW	0.	0.	140.

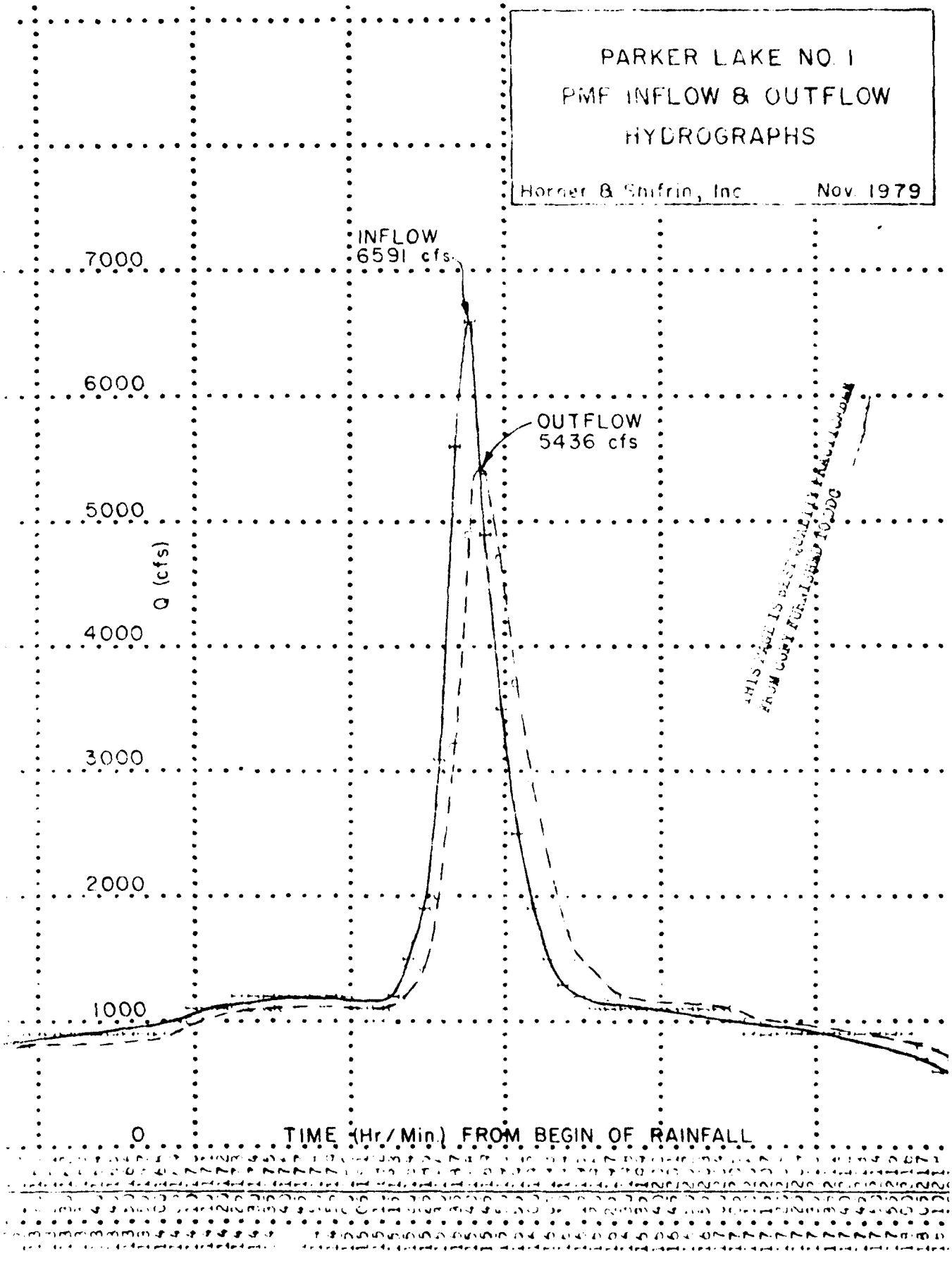
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.11	810.63	0.00	224.	123.	0.00	16.33	0.00
.12	810.71	.01	227.	141.	.42	16.25	0.00
.13	810.85	.15	231.	165.	2.25	16.17	0.00
.50	812.46	1.76	266.	2573.	7.25	15.75	0.00
1.00	813.67	2.97	290.	5436.	10.00	15.75	0.00

SUMMARY OF DAM SAFETY ANALYSIS

100-YR. FLOOD

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	808.00	808.00	810.80
STORAGE	176.	176.	227.
OUTFLOW	0.	0.	140.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	810.61	.01	227.	140.	.33	15.83	0.00


PARKER LAKE NO. 1
PMF INFLOW & OUTFLOW
HYDROGRAPHS
Horner & Shifrin, Inc
Nov. 1979
INFLOW
6591 cfs
OUTFLOW
5436 cfs
7000
6000
5000
4000
3000
2000
1000
0
Q (cfs)
TIME (Hr/Min) FROM BEGIN OF RAINFALL


DAT
ILM